

## Electrometric Aviation Soot Monitor, Phase II

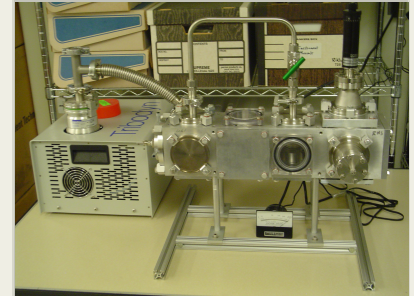
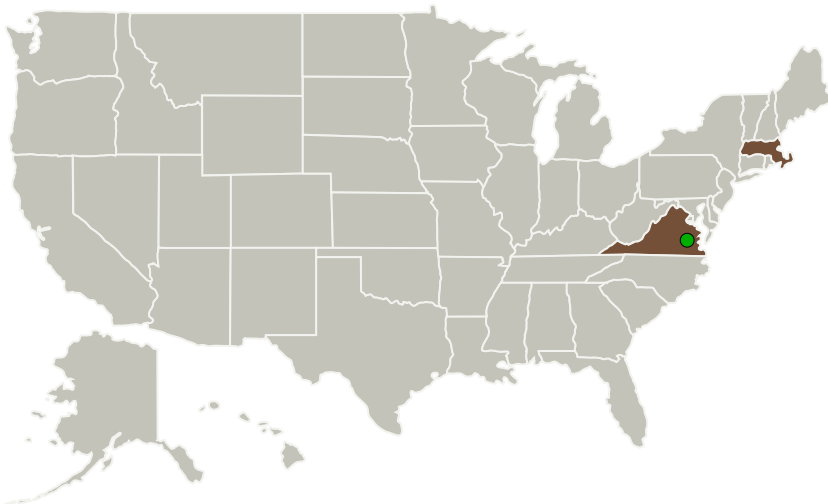
Completed Technology Project (2017 - 2019)



## Project Introduction

We propose to develop a sensitive PM measurement instrument to determine soot particle mass distribution from aircraft engine exhausts as well as from other IC engine emissions. Fundamental of the proposed technique is to measure particle charge under an electric field. Through extensive experimental and theoretical investigation on soot emissions from IC engines over the past four decades, it has been well-known that engine soot particles are usually charged. Counting particle charge at specific mass could lead to the determination of both total particle count and mass. Currently commercially available electrometric measurements on charged particles suffer from rapid signal drift, which limits its applications on soot emission measurements. In our proposed design, an amplitude modulation scheme is included to eliminate the background signal drift and also improve detection sensitivity. The proposed soot mass distribution monitor will be approximately 50 pounds in weight and consume approximately 300W electrical power. It will also be capable of being remotely controlled and operating under vacuum condition. Total cost of the proposed device could be less than \$30,000.

## Primary U.S. Work Locations and Key Partners



Electrometric Aviation Soot Monitor, Phase II Briefing Chart Image

## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

## Electrometric Aviation Soot Monitor, Phase II

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Organizations Performing Work	Role	Type	Location
Aerodyne Research, Inc	Lead Organization	Industry	Billerica, Massachusetts
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Massachusetts	Virginia

## Project Transitions

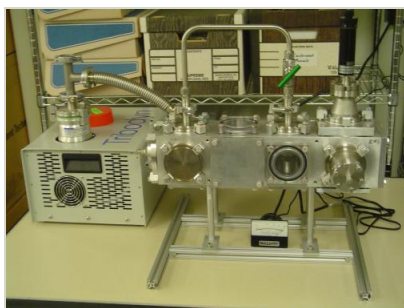
▶ **April 2017:** Project Start

✓ **July 2019:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/141040>)

## Images



## Briefing Chart Image

Electrometric Aviation Soot Monitor, Phase II Briefing Chart Image

(<https://techport.nasa.gov/image/129380>)



## Final Summary Chart Image

Electrometric Aviation Soot Monitor, Phase II

(<https://techport.nasa.gov/image/128818>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Aerodyne Research, Inc

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

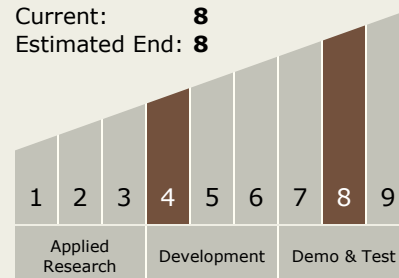
Carlos Torrez

## Principal Investigator:

Zhenhong Yu

## Technology Maturity (TRL)

Start: 4  
Current: 8  
Estimated End: 8



## Electrometric Aviation Soot Monitor, Phase II

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### Technology Areas

#### Primary:

- TX01 Propulsion Systems
  - └ TX01.1 Chemical Space Propulsion
    - └ TX01.1.3 Cryogenic

### Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System